

5

CLAIMS

1. Method for regenerating etching solutions containing iron for the use in etching or pickling copper or copper alloys, characterized by the following steps:

10

(i) feeding the etching solution to be regenerated from the etching system into an electrolysis cell being hermetically sealed or having an anode hood (8), the electrolysis cell comprising a cathode (1), an inert anode (2), means (3) for removing the electrolytically deposited copper from the cathode and means (4) for collecting the removed copper and applying a potential to the removed copper, wherein the electrolysis cell does not have an ion exchange membrane or a diaphragm,

15

(ii) electrolytically depositing the copper comprised in the etching solution at the cathode (1),

20

(iii) oxidising the Fe(II) comprised in the etching solution to Fe(III) at the anode (2),

(iv) removing the copper deposited at the cathode (1),

25

(v) applying a potential to the removed copper to prevent re-dissolving of the copper, and

(vi) returning the etching solution being thus treated to the etching system.

30

2. Method according to claim 1, characterized in that the flow of the etching solution through the electrolysis cell and/or the current flowing through the electrolysis cell is controlled by on-line measuring the concentration of Fe(II)/Fe(III) or the concentration of Cu.

35

- 5 3. Method according to claim 2, characterized in that the on-line determination of the concentration of Cu is carried out by photometric methods or by potentiometric measurement.
4. Methods according to claims 1-3, characterized in that the electrolysis is carried out in the electrolysis cell using direct current.
- 10 5. Method according to claims 1-3, characterized in that the electrolysis is carried out in the electrolysis cell using pulsed current.
- 15 6. Method according to claims 1-5, characterized in that the etching solution is allowed to flow to the cathode first and subsequently to the anode.
7. Apparatus for carrying out the method according to claims 1-6, comprising a separate electrolysis cell being hermetically sealed or having an anode hood (8), the electrolysis cell having a cathode (1) and an inert anode (2), means (3) for removing the electrolytically deposited copper from the cathode, means (4) for collecting the removed copper and for applying a potential to the removed copper, an inlet (5) in the lower region of the electrolysis cell between the cathode (1) and the means (4) for collecting the removed copper and applying a potential to the removed copper and an outlet (6), wherein the electrolysis cell does not have an ion exchange membrane or a diaphragm.
- 20 25 30
8. Apparatus according to claim 7, characterized by further having valves (7) for discharging the regenerated copper.
9. Apparatus according to claim 7 or claim 8, characterized in that the cathode (1) is in the form of a rotating cathode and the means (3) is in the form of a stripping plate.
- 35 10. System for etching or pickling of work pieces comprising an apparatus according to claims 7 to 9.